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ABSTRACT

A state survey of Maine industrial arts teachers sought to describe current curriculum attitudes and practices for use in developing teacher training curriculum at the University of Maine and to pursue the impact of Title IX (sex discrimination) legislation, new university faculty, and state and national curriculum efforts. One hundred randomly selected teachers were surveyed using a mailed questionnaire (appended). Data was tabulated and analyzed by question yielding a profile that covers the following: years teaching industrial arts, grades taught, subject taught, teaching period length, periods per class per week, course length, undergraduate and graduate education, use of state curriculum guide, kinds of laboratory activities, rating of undergraduate preparation, attitude toward subject, provisions for learning disabled and for girls in classes, career guidance of students, and most serious teaching problems. Specific recommendations were to consider undergraduate curriculum revisions to reflect trends, strengthen study of discipline and low ability students, and conduct further research on content and objectives of industrial arts taught for use in teacher education curriculum development. (FP)

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INDUSTRIAL ARTS IN MAINE - 1978

A REPORT OF THE FINDINGS OF A SURVEY OF INDUSTRIAL ARTS TEACHERS

by

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University of Southern Maine
Division of Advanced Studies

September 1978

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Introduction:

One of the primary missions of the Industrial Education program at the University of Southern Maine is to prepare teachers to teach industrial arts in the public schools of Maine. To perform that task it is felt to be necessary to maintain a current understanding not only of national trends in practice and curriculum but the state-wide status of industrial arts curriculum and practices. It was felt that industrial arts as a subject area in the public schools may currently be undergoing changes in its curriculum, scheduling, and methods due to legislation, teacher training, and state and national curriculum efforts. More especially, factors felt to be producing changes were:

1. Title IX legislation making any discrimination of educational opportunity based on sex illegal, may have brought about an increase of girls in industrial arts.
2. A relatively new and varied faculty in the University of Maine Industrial Arts Education program that may have influenced the practices of industrial arts teachers entering service in Maine during recent years.
3. State curriculum efforts by the Industrial Education program and State Department of Education over the last ten years that have defined and estimated broader definition of the content area of industrial arts, and which suggested new curriculum content and teaching strategies.
4. National curriculum efforts during the last ten to fifteen years that have defined a broader content area for industrial arts (consistent with the Maine Plan) and which also has suggested different teaching strategies.

Purpose

The specific purpose of this study was to describe various current curriculum and practices of industrial arts teachers in Maine, for use in the teacher training curriculum courses at the University of Maine, and to begin to asses the impact of the various factors noted above.

Questions to be Answered:

The specific questions to be answered were:

1. What is the range of teaching experience of Industrial Arts teachers in Maine?
2. What grades do they teach?
3. What subjects do they teach?
4. How long are their teaching periods?
5. How many periods do they meet a week?
6. How long are their courses?
7. Where did they receive their undergraduate training; and what is the status of their graduate education?
8. Do they use the state curriculum guide for Industrial Arts to structure their courses?
9. What kinds of laboratory activities do they use?
10. How do they rate the effectiveness of their undergraduate preparation in areas identified in state and national curriculum efforts?
11. How important do they feel these areas are?
12. Are they making any provisions for learning-disabled in their program?

13. Do their classes include both boys and girls; and if so, how have they been modified?
14. Have they discussed Industrial Arts teaching as a career choice with their students?
15. What are their most serious problems in teaching Industrial Arts?

The Method:

A survey of 100 randomly selected industrial arts teachers during the Spring semester of 1978.

Sample:

A mailing list of all industrial arts teachers in Maine was obtained from the State Department of Education. From that list of approximately 400 teachers, 100 were selected using a random number table. Of those, 77 responded and were used in the data analysis.

Instrumentation:

A closed questionnaire was developed (see appendix). It was validated subjectively by three other faculty members of the University of Southern Maine Industrial Education program and pilot-tested with two public school teachers for understanding.

Data Analysis:

The returned questionnaires were checked for correct answer format then key punched and analyzed at the computer facility at the University of Southern Maine. Specific statistical procedures are indicated with the presentation of findings.

FINDINGS

The findings of this study are presented in relation to the specific questions asked.

Question #1: Years teaching Industrial Arts

The analysis of the data on question #1 consisted of tabulating the frequency of each response from one to nine or more years experience teaching industrial arts.

TABLE #1 YEARS TEACHING IA

Years Teaching IA	# of Teachers	Relative %	Cumulative %
1	3	3.9	3.9
2	5	6.5	10.4
3	4	5.2	15.6
4	6	7.8	23.4
5	4	5.2	28.6
6	4	5.2	33.8
7	5	6.5	40.3
8	4	5.2	45.5
9 or more	42	54.5	100.0

Total = 77

Discussion: It was expected that the data would indicate a greater frequency of less experienced teachers, because of attrition during the first few years of teaching, and because of the larger numbers of industrial arts graduates as the University of Maine IA program has grown over the past several years. The data did not support that expectation as shown by the relatively consistent number of teachers reporting their years of teaching industrial arts, and the high percentage of teachers (54.5%) reporting nine or more years of industrial arts teaching experience.

Question #2: Grades Taught

The analysis of the data on Question #2 consisted of tabulation of the frequency of grade level taught by the teachers responding.

TABLE #2 GRADES TAUGHT

Grade Level	# of Teachers	Relative %	Cumulative %
Elementary	1	1.3	1.3
Middle	1	1.3	2.6
Junior High	10	13.0	15.6
Senior High	38	49.4	64.9
Jr./Sr. High	27	35.1	100.

Total = 77

Discussion: The data supported the expectations that there is little industrial arts taught at the elementary and middle school level in Maine.

Question #3: The Subject Taught

The analysis of the data on subjects taught consisted of the number of teachers indicating that they teach each of the subjects listed. The totals are greater than the total sample of 77 due to the fact that 66 of the teachers indicated that they taught at least two or more subjects and 56 of those three or more.

TABLE #3 SUBJECTS TAUGHT

Subject	# of Teachers	Relative %	Cumulative %
Wood	35	17.7	17.7
Metal	43	21.7	39.4
Drafting	36	18.2	57.6
Graphic Arts	6	3.0	60.6
Electronics	11	5.6	66.2
Auto/Power	20	10.1	76.3
General	17	8.6	84.9
Manufacturing	13	6.6	91.5
Construction	5	2.5	94
Energy/Trans	9	4.5	98.5
Graphic Communication	3	1.5	100

Total = 198

Discussion: When this data was analyzed, it became apparent that two factors may have influenced the responses that must be considered when drawing conclusions. The first is that some respondents may have interpreted more than one title to represent a single course such as manufacturing and wood or metal, or graphic arts and graphic communications, or general for a combination of several other subjects that were also indicated on their forms. The possible results of that interpretation may be that a greater variety and number of subject areas may have been indicated than were actually taught. A second factor that may have influenced the data is the order in which the subjects were listed. It is felt logical to assume that some if not all subjects read the list from top to bottom, left column first. It is also felt that because of the order of presentation, some subjects may have indicated the title that first appeared to represent their area, when a later and similar title may have been more appropriate. In other words, it is suspected

that a different order of presentation might have produced different data. Even with the consideration of the above possible threats to validity, the data appears to support the expectation that the more traditional areas of wood, metal and drafting are still the most common areas taught (58.6%). The higher frequency in auto/power than in graphic arts was a surprise to this researcher.

It was originally hoped that the distinction made between the more traditional titles - wood, metal, drafting, electronics, auto/power - and the newer titles of manufacturing, construction, energy/transportation, graphic communications - might produce data indicative of the degree of acceptance of the titles, and also actual curriculum changes. It is felt that even though the data may in fact be a valid indicator, caution must be used in any conclusion because of the possible validity problems discussed earlier.

Question #4: Teaching period length

The analysis of the data on period length consisted of listing the lengths given in minutes and the frequency of each response.

TABLE #4 PERIOD LENGTH

Length in Minutes	Frequency	Relative %	Cumulative %
20	2	2.7	2.7
40-45	39	53.4	56.1
46-50	22	30.1	86.2
52-55	4	5.4	91.6
60	4	5.4	97.0
80	1	1.3	99.3
90	1	1.3	*99.6
	Total = 73		

*Total % 100 due to rounding error.

Discussion: As expected, the most common length of class periods indicated was from 40 to 50 minutes, (83.5%). The two indications of 80 and 90 minutes periods may be an indication of double periods making the total from 40 to 50 minutes for single periods 86.1% of the total. This data was not used as an indicator of the number of periods per week, or of whether or not industrial arts classes met for double periods.

Question #5: Number of periods per class per week

The analysis of the data indicating the number of periods met per class per week conlisted of tabulation of the frequencies indicated, broken down by junior and senior high level.

TABLE #5: PERIODS PER CLASS PER WEEK - JUNIOR HIGH

# Periods/ Week	Frequency of Cases	Relative %	Cumulative %
1	1	3.1	3.1
2	8	25.0	28.1
3	7	21.9	50.0
4	3	9.4	59.4
5	12	37.5	96.9
6	1	3.1	100

Total = 32

TABLE #6: PERIODS PER CLASS PER WEEK - SENIOR HIGH

# Periods/ Week	Frequency of Cases	Relative %	Cumulative %
3	1	1.8	1.8
4	8	14.0	15.8
5	37	64.9	80.7
6	1	1.8	82.5
7	6	10.2	93.0
8	1	1.8	94.7
10	2	3.5	98.2
20	1	1.8	100

Total = 57

Discussion: As was expected, senior high courses met a greater number of periods per week than did junior high classes. The most common number being five per week - 64.9% of all senior high teachers reporting; and 37.5% of junior high teachers reporting. The major difference being that most (84.2%) senior high courses met five or more periods per week while most (96.9%) junior high classes met five or less per week.

Question #6: Course Length

Analysis of the data on course length consisted of tabulating the course length in weeks, broken down by junior and senior high level.

TABLE #7 COURSE LENGTH - JUNIOR HIGH

Course Length In Weeks	Frequency of Cases	Relative %	Cumulative %
4	1	3.0	3.0
6	1	3.0	6.1
9	5	15.2	21.2
10	1	3.0	24.2
12	1	3.0	27.3
18	15	45.5	72.7
27	1	3.0	75.8
36	6	18.2	93.9
38	1	3.0	97.0
45	1	3.0	100

Total = 33

TABLE #8 COURSE LENGTH - SENIOR HIGH

Course Length In Weeks	Frequency of Cases	Relative %	Cumulative %
9	4	7.1	7.1
12	2	3.6	10.7
13	1	1.8	12.5
18	35	62.5	75.0
36	10	17.9	92.9
38	3	5.4	98.2
39	1	1.8	100

Total = 56

Discussion: As expected, the most common length courses at both junior (45.5%) and senior high (62.5%) was half a year or 18 weeks. Junior high had a greater percent of ¼ year or 9 week courses (15.2%) than did senior high (7.1%). Senior high did not appear to have a much greater number of full year or 36-38 week courses (23.3%) than junior high (21.2%).

Question #7: Undergraduate and graduate education

The analysis of the data on the teacher's training consisted of tabulating the number of those with undergraduate and graduate degrees and the location at which they obtained their undergraduate education.

TABLE #9 UNDERGRADUATE & GRADUATE EDUCATION

Education	# of Teachers	%	Cumulative %
B.S. in IA	74	97.4	97.4
No Bachelors	2	2.6	100
Total =	76		
Masters in Ind. Ed.	23	38.3	38.3
Masters in Progress	7	11.7	50.0
Masters in Other Field	6	10.0	60.0
Not in Masters Program	24	40.0	100
Total =	60		

Discussion: Caution must be used in interpreting the 40% reporting that they are not in a masters program and who do not have a masters degree because of the 17 or 22.1% who did not respond to this question. It seems reasonable to expect that the majority of those who did not respond do not have a masters degree or are not in a masters program. If that is the case, the 40% is in fact a very low estimate, and may in fact represent a population of slightly over 50%.

Question #8: Use of State Curriculum Guide

The analysis of the data dealing with the use of the State Industrial Arts Curriculum Guide by industrial arts teachers to structure their courses consisted of tabulating the number who

responded that they did, did not, usually did not, or didn't know that we had one.

TABLE #10: USE OF STATE CURRICULUM GUIDE

Use	# of Teachers	%	Cumulative %
Yes	33	43.4	43.4
No	19	25.0	68.4
Usually Not	2	28.9	97.4
Didn't Know we had one	2	2.6	100

Total = 76

Discussion: It was encouraging to find that over 97% of the 76 teachers who responded to this question are apparently aware that a state-wide curriculum guide was available. The 43.4% that indicated that they use the guide is also encouraging, but leaves room for speculating as to the extent and nature of that use. The relatively large group of teachers who reported that they did not or usually did not use the guide is perhaps an indication of the degree of acceptance of the curriculum it promotes, or of the emphasis placed upon its use by the state and/or the teacher training program.

Question #9: Kinds of laboratory activities

The analysis of the data on the kinds of laboratory activities (individual projects, group projects, or mass production) consisted of mena computation for all teachers responding to provide an overall comparison of the use of the three strategies and tabulation of the frequency of responses for the degree of use by individual teachers.

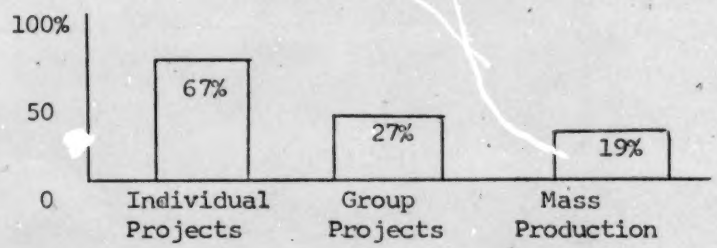

FIGURE #1
Average* Usage of Laboratory Activities

*The total percentage of more than 100% is due to the use of mid-range scores in the computation of the means, and due to the fact that a few indicated that they use these three strategies greater than 100% of the time.

TABLE #11 USE OF ACTIVITIES

	% of Time									
	0	5-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-100
Individual Projects	0	1	0	5	4	8	8	11	16	23
Group Projects	9	9	18	9	6	7	6	2	5	1
Mass Production	25	10	13	7	4	4	0	1	1	5

Discussion: The data indicated that individual projects are the most common type of laboratory activity in industrial arts courses in Maine, being used approximately two thirds of the time. When interpreting the mean amounts of usage, it must be noted that the means represent varying degrees of usage of the three methods by individual teachers as indicated in Table #11.

Question #10: How do they rate their undergraduate preparation in industrial areas identified by State and National curriculum efforts?

This question asked the teachers to rate their feelings about the degree to which their undergraduate training prepared them to teach materials processing and servicing, marketing, finance, R&D and engineering, and industrial organization. These areas are identified in the Maine Industrial Arts Curriculum guide and were felt to be consistent with other recent curruclum efforts.

The data was analyzed by computing the mean of the response which could range from 0 or no preparation to 4 or very strong preparation. Chi square and cross tabulating were also done to compare those with 1-5 years teaching experience and those with 6 or more years teaching experience in terms of their responses:

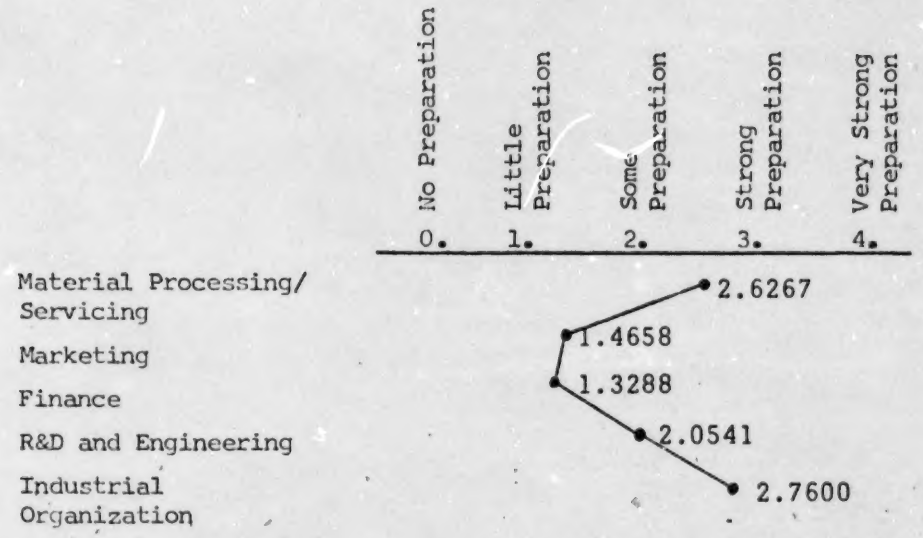

FIGURE #2

Mean Preparation Scores

Discussion: Computation of the mean response scores for the total sample indicated that as a group they feel their strongest preparation was in industrial organization followed closely by materials processing and servicing, and then R&D and engineering, marketing, and finance. It is felt, however, that conclusions must be drawn with caution because the terms were not defined on the questionnaire and also because it seems reasonable to expect that teachers with different degrees of preparation in the areas defined the terms differently.

TABLE #12

FELT DEGREE OF PREPARATION IN INDUSTRIAL AREAS
1-5 YR. EXPERIENCE AND 6+ YEARS EXPERIENCE

Preparation in Material Processing/Servicing

Count / Row Pct / Col Pct / Tot Pct	No Preparation 0.	Little Preparation 1.	Some Preparation 2.	Strong Preparation 3.	Very Strong Preparation 4.	Row Total
1-5 Yr.	0	1	8	9	4	22
	0.0	4.5	36.4	40.9	18.2	29.3
	0.0	16.7	33.3	27.3	36.4	
	0.0	1.3	10.7	12.0	5.3	
6+ Yr.	1	5	16	24	7	53
	1.9	9.4	30.2	45.3	13.2	70.7
	100.0	83.3	66.7	72.7	63.6	
	1.3	6.7	21.3	32.0	9.3	
Column Total	1	6	24	33	11	75
	1.3	8.0	32.0	44.0	14.7	100.0

CHI Square = 1.39462 with 4 degrees of Freedom Significance = 0.8451
Number of Missing Observations = 2

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Count / Row Pct / Col Pct / Tot Pct	0.	1.	2.	3.	4.	Row Total
1-5 Yr.	4	6	8	2	2	22
	18.2	27.3	36.4	9.1	9.1	30.1
	23.5	24.0	34.8	33.3	100.0	
	5.5	8.2	11.0	2.7	2.7	
6+ Yr.	13	19	15	4	0	51
	25.5	37.3	29.4	7.8	0.0	69.9
	76.5	76.0	65.2	66.7	0.0	
	17.8	26.0	20.5	5.5	0.0	
Column Total	17	25	23	6	2	73
	23.3	34.2	31.5	8.2	2.7	100.0

CHI Square = 5.70095 with 4 Degrees of Freedom Significance = 0.2226
Number of missing observations = 4

RESEARCH AND DEVELOPMENT

Count / Row Pct / Col Pct / Tot Pct	0.	1.	2.	3.	4.	Row Total
1-5 Yr.	2	3	6	9	2	22
	9.1	13.6	27.3	40.9	9.1	29.7
	25.0	37.5	18.2	40.9	66.7	
	2.7	4.1	8.1	12.2	2.7	
6+ Yr.	6	5	27	13	1	52
	11.5	9.6	51.9	25.0	1.9	70.3
	75.0	62.5	81.8	59.1	33.3	
	8.1	6.8	36.5	17.6	1.4	
Column Total	8	8	33	22	3	74
	10.8	10.8	44.6	29.7	4.1	100.0

CHI Square = 5.69857 with 4 Degrees of Freedom significance = 0.2228
Number of Missing observations = 3

INDUSTRIAL ORGANIZATION

Count / Row Pct / Col Pct / Tot Pct	0.	1.	2.	3.	4.	Row Total
1-5 Yr.	1 4.5 100.0 1.3	2 9.1 50.0 2.7	1 4.5 4.5 1.3	12 54.5 36.4 16.0	6 27.3 40.0 8.0	22 29.3
6+ Yr.	0 0.0 0.0 0.0	2 3.8 50.0 2.7	21 39.6 95.5 28.0	21 39.6 63.6 28.0	9 17.0 60.0 12.0	53 70.7
Column Total	1 1.3	4 5.3	22 29.3	33 44.0	15 20.0	75 100.0

CHI Square = 11.36460 with 4 Degrees of Freedom Significance = 0.0228
Number of Missing Observations = 2

Discussion: The Chi square analysis of the data indicated that in all areas except for industrial organization, the differences in the frequencies of responses observed could very well have been due to chance (see levels of significance in Table #12). These findings indicate that the differences found are not strong evidence of differences between the population groups and therefore are inconclusive.

The level of significance of 0.0228 found for industrial organization does provide strong evidence that the observed difference in frequencies do in fact represent actual differences in the population, with those teachers with less experience indicating a wider range in their feelings and a higher percentage in the strong and very strong preparation categories. Mean ratings for the two groups were 2.91 for the 1 - 5 year teachers and 2.70 for those with 6 or more years experience.

Question #11: How important do they feel it is to teach the industrial areas identified?

The industrial areas used in this question were the same as those used in question number 10. The data was analyzed by computing the mean of the responses which would range from 0 or no importance to 4 or most important. Cross tabulations and chi square were done to

compare the teachers with 1-5 years experience with those with 6 or more years experience.

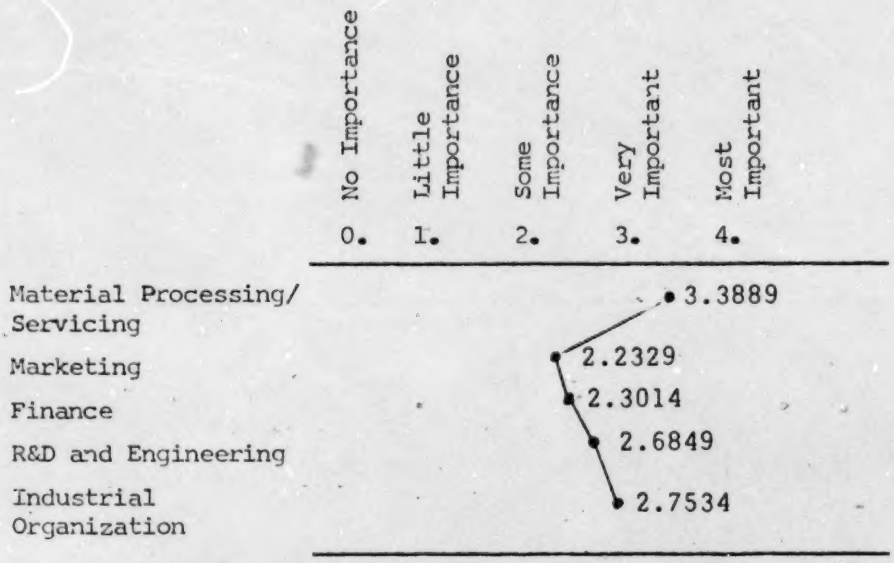

FIGURE #3

Importance of Teaching Industrial Areas

Discussion: Computation of the mean response scores indicated that as a group, the teachers felt that all the areas were of at least some importance with materials processing and servicing being the most important; and marketing and finance being the least important.

TABLE #13

FELT IMPORTANCE OF TEACHING INDUSTRIAL AREAS
1-5 YR. EXPERIENCE & 6+ YEARS EXPERIENCE

Importance of Teaching Material Processing/Servicing

Count Row Pct Col Pct Tot Pct	No Importance 0.	Little Importance 2.	Some Importance 3.	Very Important 4.	Row Total
1-5 Yr.	0 0.0 0.0 0.0	3 13.6 37.5 4.2	7 31.8 29.2 9.7	12 54.5 30.8 16.7	22 30.6
6+ Yr.	1 2.0 100.0 1.4	5 10.0 62.5 6.9	17 34.0 70.8 23.6	27 54.0 69.2 37.5	50 69.4
Column Total	1 1.4	8 11.1	24 33.3	39 54.2	72 100.0

CHI Square = 0.64448 with 3 Degrees of Freedom Significance = 0.8862
Number of Missing Observation = 5

MARKETING

Count / Row Pct / Col Pct / Tot Pct	0.	1.	2.	3.	4.	Row Total
1-5 Yrs.	0 0.0 0.0 0.0	4 18.2 40.0 5.5	7 31.8 19.4 9.6	10 45.5 52.6 13.7	1 4.5 16.7 1.4	22 30.1
6+ Yrs.	2 3.9 100.0 2.7	6 11.8 60.0 8.2	29 56.9 80.6 39.7	9 17.6 47.4 12.3	5 9.8 83.3 6.8	51 69.9
Column Total	2 2.7	10 13.7	36 49.3	19 26.0	6 8.2	73 100.0

CHI Square = 8.36301 with 4 Degrees of Freedom Significance = 0.0792
Number of Missing Observations = 4

FINANCE

Count / Row Pct / Col Pct / Tot Pct	0.	1.	2.	3.	4.	Row Total
1-5 Yrs.	1 4.5 50.0 1.4	4 18.2 44.2 5.5	7 31.8 21.9 9.6	8 36.4 32.0 11.0	2 9.1 40.0 2.7	22 30.1
6+ Yrs.	1 2.0 50.0 1.4	5 9.8 55.6 6.8	25 49.0 78.1 34.2	17 33.3 68.0 23.3	3 5.9 60.0 4.1	51 69.9
Column Total	2 2.7	9 12.3	32 43.8	25 34.2	5 6.8	73 100.0

CHI Square = 2.55949 with 4 Degrees of Freedom Significance = 0.6340
Number of Missing Observations = 4

RESEARCH AND DEVELOPMENT

Count / Row Pct / Col Pct / Tot Pct	0.	1.	2.	3.	4.	Row Total
1-5 Yrs.	0 0.0 0.0 0.0	2 9.1 40.0 2.7	5 22.7 29.4 6.8	12 54.5 30.8 16.4	3 13.6 30.0 4.1	22 30.1
6+ Yrs.	2 3.9 100.0 2.7	3 5.9 60.0 4.1	12 23.5 70.6 16.4	27 52.9 69.2 37.0	7 13.7 70.0 9.6	51 69.9
Column Total	2 2.7	5 6.8	17 23.3	39 53.4	10 13.7	73 100.0

CHI Square = 1.10550 with 4 Degrees of Freedom Significance = 0.8934
Missing Number of Observations = 4

INDUSTRIAL ORGANIZATION

Count / Row Pct / Col Pct / Tot Pct	0.	1.	2.	3.	4.	Row Total
1-5 Yrs.	3 13.6 37.5 4.1	4 18.2 18.2 5.5	9 40.9 34.6 12.3	6 27.3 37.5 8.2	0 0.0 0.0 0.0	22 30.1
6+ Yrs.	5 9.8 62.5 6.8	18 35.3 81.8 24.7	17 33.3 65.4 23.3	10 19.6 62.5 13.7	1 2.0 100.0 1.4	51 69.9
Column Total	8 11.0	22 30.1	26 35.6	16 21.9	1 1.4	73 100.0

CHI Square = 2.79046 with 4 Degrees of Freedom Significance = 0.5935
Number of Missing Observations = 4

Discussion: The Chi square analysis of the data incicated that in all areas except marketing the differences in the frequencies observed could very well have been due to chance (see level of significance in Table #13). These findings indicate that the differences found are not strong evidence of differences between the population groups and are therefore inconclusive. The high levels of significance for materials processing and servicing, and R&D and engineering and the observed similarities in the column percentages do suggest that the two groups are similar in their feelings of the importance in teaching these areas.

The level of significance of 0.0792 found for marketing provides some evidence that the observed differences in frequencies between the groups do in fact represent actual differences in the population; with the 1-5 year teachers rating marketing more important. Mean rating for the two groups were 2.36 for the 1-5 year teachers and 2.176 for those with 6 or more years experience.

Question #12: Are they making any provisions for the learning-disabled in their program?

Analysis of the data consisted of frequency tabulation and relative percentages. Forty six or 59.7% indicated that they were making specific provisions for the learning disabled in their program and 31 or 40.3% indicated that they were not.

Question #13: Do their classes include both boys and girls; and if so, how, if at all, have the classes been modified?

The analysis of the data for this question consisted of frequency tabulation and relative percentages of those teachers indicating that they did or did not have both boys and girls in their classes, and frequency tabulation of the numbers of teachers who indicated that their courses had been modified in terms of: shortened periods, shortened course, enlarged class sizes, elimination of certain classes, changes in content to attract girls, budget increases, budget decreases other, or no changes.

Seventy three or 94.8% of the teachers indicated that their pro-

grams included both goys and girls, and 4 or 5.2% indicated that it did not. The modifications made in their courses are tabulated in Table #14 with over half of the teachers (57.8%) indicating that no changes had been made. Of the changes made, shortening of course length, larger classes, were the most common changes.

TABLE #14

Class Modifications to Provide for Girls

Modification	Frequency Reported
Class periods shortened	5
Course length shortened	9
Class size enlarged	9
Classes eliminated	3
Content Changed	3
Budget increased	1
Budget decreased	0
Other	8
No change	52

# of Teachers Responding = 72
Total # of responses = 90

Question #14: Have they discussed Indistrial arts teaching as a career choice with any of their students within the last year?

The analysis of the data to this question consisted of frequency tabulation and relative percentages of the responses. Of the 77 teachers responding, 52 or 67.5% indicated they they had discussed Industrial Arts teaching as a career with students within the last year, and 25 or 32.5% had not.

Question #15: What do they perceive as their most serious problems in teaching Industrial Arts?

This question asked the teachers to select what they felt caused the most problems in their teaching of Industrial Arts from the list shown in Table #15. They were asked to rank the top three problems in order from most serious.

Analysis of the data consisted of tabulation of the frequency and percentage of what they indicated was their most serious problem and frequency and percentage that the responses appeared in the top three.

TABLE #15

Most Serious Problem in Teaching Industrial Arts

Problem	Frequency	%
Discipline	15	20.0
Finances	21	28.0
Inadequate technical preparation	2	2.7
Inadequate Professional preparation	0	0
Lack of administrative support	7	9.3
Poor image of IA by students	0	0
Poor image of IA by teachers	0	0
Preparing materials for problem students	5	6.7
Ability of students	12	16.0
Other	13	17.3

Total Responses = 75

TABLE #16

Top Three Problems in Teaching Industrial Arts

Problem	Frequency	%
Discipline	29	14.6
Finance	42	21.1
Inadequate technical preparation	3	1.5
Inadequate Professional preparation	3	1.5
Lack of administrative support	16	8.0
Poor image of IA by students	9	4.5
Poor image of IA by teachers	7	3.5
Preparing materials for problem students	24	12.1
Ability of students	39	19.6
Other	27	13.6
	199	100

Response #10 or other on this question was open-ended, and produced the following problems and frequencies:

Facilities	7
Class Size	4
Theft	1
Disinterested students	1
Guidance Dept.	2
Scheduling	10
Paper Work	1
Inexperienced IA teachers	1
Inadequate faculty	1
(Apparent need to compete with vocational center)	1

Equipment Maintenance 1
(low ability students in regular classes) 1
Study halls & lunch duty 1
(Math & reading skills of students) 1

Discussion: As indicated by the data, Industrial Arts teachers in Maine view finances, discupline and the ability of their students as their most serious problems. Finances was the most frequent reponse as their number one problem and as the problem that appeared when all responses were tabulated. Discipline was the second most frequent number one problem followed by the ability of their students.

CONCLUSIONS

If the data obtained in this survey is used to develop a profile of the "typical" Industrial Arts teacher in Maine (recognizing the inherent weaknesses in this approach), he would look like the following:

He is an experienced teacher with at least a 50% chance of having nine or more years teaching Industrial Arts. He has a bachelors degree in Industrial Arts earned in Maine but has only about a 38% chance of having a Masters degree in Industrial Arts, and is probably not currently working toward it. He probably teaches woodworking, metal working, drafting or automotives in a senior high or junior-senior high school during 40-50 minute periods for five periods per week, for 18 weeks. He is aware of the state curriculum, but probably does not make much use of it to structure his courses. As far as laboratory activities are concerned, he uses mostly individual projects with relatively little time spent in mass production or group activities. He rates his undergraduate preparation as having been fairly strong in industrial organization and materials processing and servicing, some preparation in R&D and engineering, but weak in the industrial areas of finance and marketing. He feels that materials processing and servicing are the most important industrial areas to teach, but also feels that industrial organization, R&D and engineering, finance, and marketing have some importance. Chances are he has girls in his classes, and is making specific provisions for learning-disabled students. He feels that his most serious problems are finances, discipline and the ability of his students.

In relation to the basic purposes of this research to describe the current practices of Industrial Arts in Maine and to assess the impact of recent legislation, changes in the faculty in the Industrial Arts teacher education program and state and national curriculum efforts some conclusions can be made ; even though they are limited due to the inadequacies of a single questionnaire and a general lack of previous research on the specific problem.

The fact that a very high percentage of the teachers responding (94.8%) indicated that they had girls in their classes indicated that they are not being denied access and may be a change promoted by Title IX legislation.

Chi square analysis of the teachers' feelings about their undergraduate preparation in and feelings of the importance of teaching of the Industrial areas of materials processing and servicing, marketing, finance, R&D and engineering, and industrial organization suggested that there probably is little difference between the teachers with fewer than six years experience and those with more. To this researcher, this suggested that the changes in faculty within the last six years at the University of Southern Maine has had little effect on how they perceive the preparation in terms of the areas identified, and has also not changed their attitudes about what areas are important to teach.

In terms of the state and national curriculum efforts of the past decade, the industrial arts teachers are quite conservative in terms of both content and class activities, although they do agree that all the areas identified are of some value for Industrial Arts. The findings that by far the most common courses are woodworking, metal working, drafting and automotive/power agree closely with the 1966 national study by Schmitt and Pelley that found that woodworking, drafting and metal working made up the content of most industrial arts programs. The findings that approximately 2/3 of the activity time is spent on individual projects, and that approximately 1/3 of the teachers indicated that they never use mass production activities suggest to this researcher that Maine industrial arts teachers are conservative in their selection of activities and have been little influenced by the curriculum efforts that make greater use of activities other than individual projects.

The lower ratings of the importance of Marketing & Finance also suggest little influence by curriculum that include them as an important part of the basic content of industrial arts. The data collected did provide much current information concerning scheduling and practices to be used in undergraduate curriculum courses. The indication that the industrial arts teachers in Maine feel that discipline and the ability of their students are among their greatest problems not only suggests factors that may be beyond their control but also that the teacher training program should perhaps better prepare them in those areas.

The feeling by the teachers that finance is their major problem is perhaps a reflection of inadequate budgeting by administrators, possibly due to lack of recognition of the high cost of many industrial arts courses or may be a reflection of ever-limited resources that must be allocated throughout the educational system.

Recommendations:

Based on the findings of this study it is recommended that:

1. If the faculty of the Indistrial Arts Teacher Education Program feel that it is important that their graduates more closely reflect newer curriculum trends, that they make a more extensive assessment of current practice and consider undergraduate curriculum revision.
2. The study of educational practice dealing with discipline and low ability students be strenthened in the teacher training program.
3. Further study be done to better identify the content and objectives of industrial arts as taught in Maine to provide a better base for undergraduate and in-service education and to assess future change.

APPENDICES

GENERAL:

____ Years teaching industrial arts: 1, 2, 3, 4, 5, 6, 7, 8, 9, 9+

____ Grade level: 1 - elementary
2 - middle
3 - junior high
4 - senior high
5 - junior and senior high

____ Industrial Arts subjects taught:

____ 1 - wood	7 - general
____ 2 - metal	8 - manufacturing
____ 3 - drafting	9 - construction
4 - graphic arts	10 - energy/transportation
5 - electronics	11 - graphic communications
6 - auto/power	

SCHEDULING:

____ Length of periods in minutes

JH ____ Number of periods per week for each Industrial Arts class (indicate junior
SH ____ and/or senior high level)

JH ____ Length of course in weeks
SH ____

TEACHER EDUCATION:

____ Where did you obtain your undergraduate degree:

1 - Maine	4 - New York
2 - Massachusetts	5 - Pennsylvania
3 - New Hampshire	6 - Other

DEGREE:

Type of degree held:
____ 1 - B.S., Industrial Arts
2 - B.S., other
3 - No B.S. degree

____ 1 - Master's in Industrial Arts or Industrial Education awarded
2 - Master's in Industrial Arts or Industrial Education in progress
3 - Master's in other field awarded or in progress
4 - Not in Master's program

In the following section, please rate the degree to which you feel your undergraduate program prepared you to teach the following facets of industry:

____	Material Processing/Servicing	0	1	2	3	4
____	Marketing	0	1	2	3	4
____	Finance	0	1	2	3	4
____	R&D and Engineering	0	1	2	3	4
____	Industrial Organization	0	1	2	3	4

0 = no preparation
1 = little preparation
2 = some preparation
3 = strong preparation
4 = very strong preparation

Indicate the extent of which you use the following activities in your Industrial Arts class:

	Never	5-10%	10-20%	20-30%	30-40%	40-50%	50-60%	60-70%	70-80%	80-100%
___ Individual projects	0	1	2	3	4	5	6	7	8	9
___ Group projects	0	1	2	3	4	5	6	7	8	9
___ Mass production	0	1	2	3	4	5	6	7	8	9

___ Do you use the state curriculum guide for industrial arts to structure your courses:
1 - Yes
2 - No
3 - Usually not
4 - Didn't know we had one

___ Are you making any specific provisions for learning-disabled within your program:
1 - Yes
2 - No

___ Does your IA program include both boys and girls:
1 - Yes
2 - No

___ If yes, indicate how your classes were modified to make provisions for girls:
1 - Class periods shortened
2 - Course length shortened
3 - Class size enlarged
4 - Elimination of certain IA classes
5 - Change in content of course to attract girls
6 - Budget increase
7 - Budget decrease
8 - Other
9 - No changes

___ Have you discussed industrial arts teaching as a career choice with any of your students within the last year:
1 - Yes
2 - No

___ In your opinion, what causes the most problems in your teaching of Industrial Arts (rank top three in order from most serious):
1 - Discipline
2 - Finances
3 - Inadequate technical preparation
4 - Inadequate professional preparation
5 - Administrative, lack of support
6 - Poor image of IA by students
7 - Poor image of IA by teachers
8 - Preparing materials for problem students
9 - Ability of students
10 - Other: _____

In the following section, please rate the degree to which you feel teaching the following facets of industry in industrial arts are important:

___ Material Processing/Servicing	0 1 2 3 4	0 = no importance
___ Marketing	0 1 2 3 4	1 = little importance
___ Finance	0 1 2 3 4	2 = some importance
___ R&D and Engineering	0 1 2 3 4	3 = very important
___ Industrial Organization	0 1 2 3 4	4 = most important